

WG: C37.010 - Circuit breaker application Guide

Chair: Helmut Heiermeier

Vice Chair: Xi Zhu

Secretary: Mike Skidmore

Location: Asheville, NC

Participants: 45 participants (including Chair, Vice Chair, and Secretary)

27 members

18 guests

- 1.) The meeting started with the chair introduction and introductions of the attendees. The chair asked all attendees to sign the roster and provide affiliation if not noted on the roster.
- 2.) The chairman reviewed the minutes of the meeting (MOM) from Orlando. The MOM from Orlando was distributed to all committee members and guests of C37.010 on 5-21-14 after the spring meeting. The secretary (Mike Skidmore) also distributed the draft (MOM) on 9-15-14 to all members and guests listed on the committee roster.
- 3.) The chair entertained a motion from John Webb to approve the MOM from Orlando. Roy Alexander seconded the motion. The motion passed unanimously.
- 4.) Ben Bufi said that he provided additional information for section 5.27 for breaker switching with closing resistors. This information didn't make it into draft #9 of C37.010. Helmut apologized and he did not receive the information. The information was provided to the Secretary of C37.010 and somehow the secretary thought the information was also submitted to the chair. Helmut asked Ben to discuss the information later in the meeting.
- 5.) The chair updated the committee on the status of the working group and the work performed to date. Helmut said he will go over work performed to date, discussion of selected comments, and discussion on the completed document. Helmut said he will discuss comments received from Draft 9. Draft 9 was submitted to members of the working group committee for C37.010 a few weeks prior to the meeting.
- 6.) The chair asked the committee if he should wait until C37.04 and C37.09 is approved before C37.010 is re-balloted. There is much information in C37.04 and C37.09 under review and some parts of C37.010 depend on the outcome for the other documents. The committee agreed that Helmut should not wait on C37.04 and C37.09. There is not sufficient time to wait for the other document to be completed. Helmut agreed to move forward with the document.
- 7.) Carl Schuetz discussed his contributions to section 6.0. He recreated many graphs and updated the committee on improved sections. He tried to research where some of the figures (i.e. Figures 11, 12, 13) came from but with no success. He only tried to recreate the figures to a better electronic format to make the graphs easier to read. Ken Edwards said he had the graphs and the formulas recreated several years ago from previous meetings and will provide the information to Carl. Carl asked if there is someone who can verify what he did to convert the

graphs is correct. John Webb volunteered to verify the graphs are correct. He will try to go back and compare information from 1979 to the present guide.

It was recommended that maybe a task force (TF) be formed for a future revision of C37.010 to try and better understand where the information from the graphs (i.e. Figures 11,12,13) came from. Roy Alexander said that much of the data and information is probably empirical and there may be no way to understand how it was first introduced into the document. The committee seemed to agree that a Task Force (TF) be developed later to review the accuracy of the graphs.

There was additional discussion about wind farms and “remote” and “local” contribution to the faults. The committee agreed that for future improvements maybe a Task Force (TF) should also be established to review this issue since many modern transmission systems are a little different today.

Roy Alexander suggested that Carl should add “fault current” to table 24 in subclause 6.4.1. Carl and Helmut agreed.

Xi Zhu said that in equation #24 (page 57) –the CPT (Contact Part Time) need to be removed, since it is only the time to peak which is 8.33ms if on 60Hz. Carl and Helmut said he will review and update.

There were also statements that some of the examples for equation #24 only include (2.6 for 60Hz) close and latch and if the document should include examples for (50 Hz). Carl and Helmut said they will review these comments but additional examples may not be possible if we plan to submit the document for ballot soon.

Arben Bufi asked if examples should be included if X/R is greater than 17 such as 50. Helmut will review this comment.

8.) Hua Ying Liu said that she believes that section 5.14.3 should have a separate sub clause (section) for the “opening”. Helmut said he will review

9.) Denis Dufournet suggested that any TLF (Transformer Limited Fault) and TRV information in C37.010 should reference C37.011. Someone said that page #43 line 35 already refers to C37.011. It seemed the chair will review this issue but the general feeling is that it would not hurt to keep the hints on TLF in the document. Finally the agreement was reached to remove all text just keep the hint to C 37.011

10.) Ben presented information for closing resistors for section 5.27. The committee thought the additional information was relevant and should be included in the document. After the meeting, Ben was notified that some graphs are in color and should be changed. It is believed the official C37.010 document will not allow for colored graphs. Ben said he will update the information and provide it back to the secretary and chair.

11.) Charles Hendrickson asked if there should be as section to warn users about using synchronous controller if lines are compensated (i.e. shunt reactors). In some cases if you have a CO (Close-Open) event for the breaker with shunt reactors (inductors) you may have a lack of zero current crossing and fail the breaker. Some studies show that closing resistor will help provide a current crossing in a case like this. Mike Skidmore agreed that a statement should be added since AEP had failures related to this event and we should warn the users. It is not a problem of the breaker but how it is operated. Charles said he would provide wording to Helmut for this issue to warn the user of the breaker.

- 12.) Roy Alexander will review new and better wording for sub clause 5.10.2. This will be provided to Helmut.
- 13.) Will Zhang commented on 3 issues. Page #2, line 4 and line 28 are the same and there should only be one listed. Some of the graphs and Figures are difficult to read and should be corrected. Page 57 line 31, have the word “current” listed twice. Helmut will review and correct.
- 14.) The chair plans to submit draft #10 and ballot by November of 2014. This will allow him to collect comment and review at the meeting in the spring of 2015.
- 15.) The working group committee agreed to adjourn meeting.
- 16.) All slides provided at the meeting are included as attachments.
- 17.) After the meeting, the HVCB subcommittee secretary reviewed the PAR which expires at the end of 2015. It seems it is best for Helmut to apply for a PAR extension of one more year. A PAR extension in the fall of 2015 is too late. In general, it is unlikely we will be able to correct and respond to all comment by the end of 2015. The chair agreed he will ask for a PAR extension, likely after the document goes to ballot later this year.

Meeting Roster – Asheville

First Name	Last Name	Role	Company	Asheville 9/22/2014
Mehmet	Adanur	Guest	Southern Company Services	
Syed Shahab Uddin	Ahmed	Member	Siemens Energy Inc	X
Roy	Alexander	Member	RWA Engineering	X
Michael	Anderson	Member	Retired	
Mauricio	Aristizabal	Member	ABB	
Roy	Ayers	Guest	Nashville Electric Service	X
William	Bane	Guest	Nashville Electric Service	
Amildo	Barrio	Guest	Parsons	
George	Becker	Member	Electric Power Research Institute	
Robert	Behl	Member	ABB	
W.J. (Bill)	Bergman	Member	PowerNex Associates Inc.	
Stan	Billings	Member	Mitsubishi Electric PP	X
Anne	Bosma	Member	ABB AB	X
Cody	Brehm	Member		
Steven	Brown	Member	Allen & Hoshall	
Raymond	Browning	Guest	FirstEnergy Corp.	
Arben	Bufi	Member	Hitachi HVB, Inc.	X
Eldridge	Byron	Member	Schneider Electric	
Donald	Cantrelle	Guest	Georgia Power	X
Gilbert	Carmona	Member	Southern California Edison	X

Stephen	Cary	Member	Eaton Corporation	X
Steven	Chen	Member	Eaton Corporation	
Chih	Chow	Member	PEPCO	X
Michael	Christian	Member	ABB	
Roggero	Ciofani	Guest	Altalink	
Lucas	Collette	Guest	Mitsubishi Electric	X
Dave	Collette	Guest	Mitsubishi Electric	X
Lee	Cox, Jr.	Guest	Efacec	
Michael	Crawford	Guest	Mitsubishi Electric	X
David	Dart	Guest	NOJAPower	
Jerod	Day	Guest	Vacuum Interrupters, Inc.	
Patrick	Di Lillo	Member	Consolidated Edison Co. of NY, Inc.	
Denis	Dufournet	Member	Alstom Grid	X
Edgar	Dullni	Member	ABB	
Carolyn	Durham	Guest	Entergy	
John	Eastman	Member	INCON	X
Ken	Edwards	Member	Bonneville Power Administration	X
Leslie	Falkingham	Member	Vacuum Interrupters Limited	
Thomas	Field	Member	Engergy	
Lori	Fish	Guest	Entergy	
Shane	Ford	Guest	Nashville Electric Service	
Robert	Foster	Guest	Megger	X
Paul	Fox	Guest	Schneider Electric	
Douglas	Giraud	Guest	Powell Electrical Systems	X
John	Hall	Guest	Tennessee Valley Authority	X
Daryl	Hallmark	Guest	Southern Company Services	
John	Harley	Guest	FirstPower Group LLC	
Helmut	Heiermeier	Chair	ABB	X
Charles	Hendrickson	Guest	Arizona Public Service Company	X
Victor	Hermosillo	Member	Alstom Grid	
Jingxuan (Joanne)	Hu	Guest	RBJ Engineering Corporation	
Roy	Hutchins	Guest	Southern Company Services	X
Todd	Irwin	Member	Alstom Grid Inc	X
Carlos	Isaac	Guest	Oncor Electric Delivery	
Richard	Jackson	Member	Detroit Edison	
Anton	Janssen	Guest	Liander	
Cory	Johnson	Member	BPA	
Carl	Kurinko	Guest	ABB Inc.	
Thomas	Lagerstrom	Guest	Pedersen Power Products	
Stephen	Lambert	Member	Shawnee Power Consulting, LLC	
Matthew	Lawrence	Guest	Doble Engineering	
Werner	Lesse	Guest	Siemens AG	X
Wangpei	Li	Guest	Eaton	

Hua Ying	Liu	Member	Southern California Edison	X
Li	Liu	Member	Eaton	
Albert	Livshitz	Member	CE Power Solutions	
Bjorn	Lofgren	Member	Siemens Energy	
Russell	Long	Member	Retired	X
Jess	Mains	Guest	ABB Inc	
Antonio	Mannarino	Guest	PSE&G	
Vincent	Marshall	Guest	Southern Company Services	X
Gary	Martin	Member	Entergy	X
Ricardo	Martinez	Guest	CFE-LAPEM	X
John	Marzula	Guest	Mitsubishi	
Frank	Mayle	Member	Technibus, Inc.	
Neil	McCord	Guest	Southern States	
Timothy	McGee	Guest	Siemens Energy	
Dave	Mitchell	Member	Dominion	X
Georges	Montillet	Member	GFM Consulting LLC	
Stephanie	Montoya	Member	Southern California Edison	
Tom	Mulcahy	Member	Dominion	X
Volney	Naranjo	Guest	Megger	
Jeffrey	Nelson	Member	Tennessee Valley Authority	
Joe	Nims	Guest	Allen & Hoshall	
Mirko	Palazzo	Member	ABB	
Shawn	Patterson	Member	US Bureau of Reclamation	
Thomas	Pellerito	Member	DTE Energy	
Alan	Peterson	Guest	Utility Service Corporation	
Lise	Phan	Member	Parcific Gas and Electric Company	
Cornelius	Plath	Guest	Omicron electronics	
Reynaldo	Ramos	Member	Southern Company	
Frank	Ricard	Guest	FirstPower Group LLC	
Anthony	Ricciuti	Member	Eaton Corporation	
Brian	Roberts	Guest	Southern States, LLC	
Jon	Rogers	Member	Siemens Energy, Inc	
Ben	Rosenkrans	Guest	Eaton Corporation	
Charles	Ross	Member	PGH Wong Engineering	
Roderick	Sauls	Member	Southern Company Services	X
Carl	Schuetz	Member	American Transmission Company (ATC)	X
Jon	Schumann	Member	American Transmission Company	X
Mike	Seabrook	Guest	GE	
Devki	Sharma	Member	Consultant	X
Sushil	Shinde	Member	ABB Inc.	X
Sunita	Singh	Guest	Bechtel OG&C	
Michael	Skidmore	Secretary	AEP	X
Zachary	Smith	Member	Mitsubishi Electric Power Products,	

			Inc.	
Erin	Spiewak	Guest	IEEE	X
Don	Steigerwalt	Member	Duke Energy	X
Donald	Swing	Guest	Powell Industries	X
Humayun	Tariq	Guest	American Electric Power	X
Jey	Thayalan	Guest	Schneider Electric	
Vernon	Toups	Guest	Siemens	X
Stephen	Tyler	Guest	Dominion	
James	van de Ligt	Member	CANA High Voltage Ltd.	
Steve	Vatterott	Guest	ABB Inc.	
Wes	Wadsworth	Guest	Hitachi HVB, Inc.	
John	Webb	Member	ABB	X
Casey	Weeks	Guest	Siemens Energy	
Jan	Weisker	Member	Siemens AG	
Oon	Yek	Guest	Pacific Gas & Electric	
Dong Sun	Yoon	Guest	HICO America	
Richard	York	Guest	GE Digital Energy	
Jiong	Zhang	Member	MEPPI	
Wei	Zhang	Guest	Hitachi HVB, Inc.	X
Xi	Zhu	Vice-Chair	GE Energy Management	X

“X” - individual was at the meeting in Asheville